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EP 0701865 A1 WO 94/11108 A1 WO 93/08913 A1  
DE 920004388 U US 4748859 A

(58) Field of Search

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(54) Abstract Title

Pipette tip with end seal

(57) Pipette tip having a sealing surface 1 arranged at the end and a pressure-exerting annular surface 2 beneath the sealing surface, against which annular surface there comes to bear a pressure-exerting element 5, by means of which the pipette tip is indirectly brought to bear in a frictionally locking manner against an abutment 6.

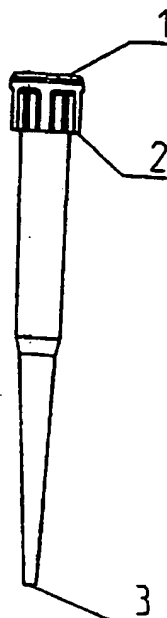


Fig. 1

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Fig. 2



Fig. 1

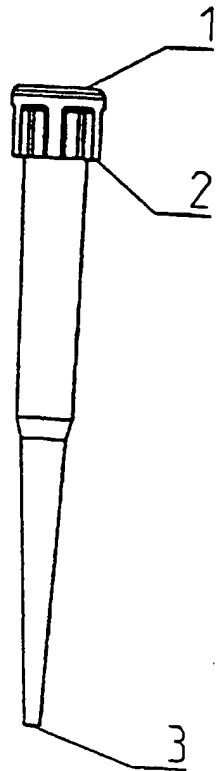


Fig. 3



Fig. 4

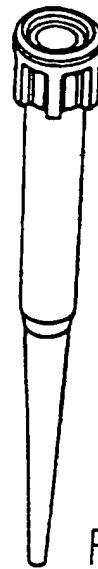
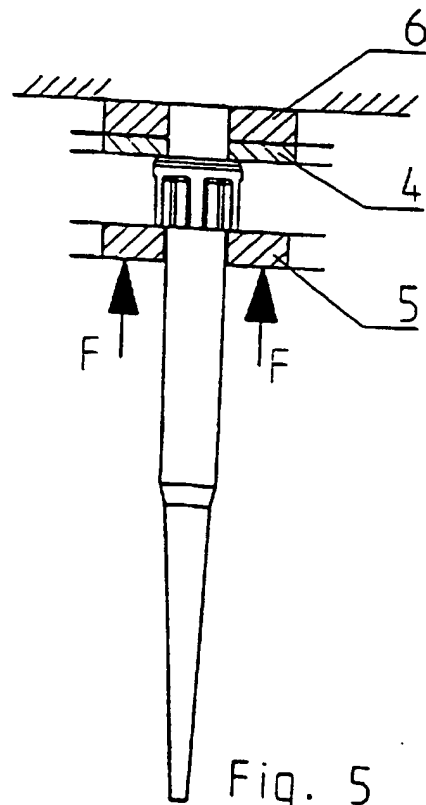


Fig. 5



## Pipette Tip

Pipette tips are often used as disposable articles in day-to-day laboratory practice. The use of manual and motorized pipettes in particular makes it possible for liquids to be handled conveniently. Compatible with so-called microtitration plates, multi-channel pipettes are in use, see for example catalogs from the companies COSTAR, GREINER, Eppendorf or Labsystems.

In the prior art there are two different principles for creating the seal between the pipette tip and the pipette. The method found most often on the market, that of pushing the pipette tips onto a cone, can in turn be divided into two technical solutions. Some manufacturers use O-rings on the cone, others seal the tips by providing sealing lips on their inner side opposite the fitted-on cone. The sealing of pipette tips from the end, known from German Utility Model G9204388, is a completely different type of seal. The advantage of this principle is that a large number of pipette tips can be connected simultaneously in a sealed manner with respect to a pipetting device with only little expenditure of force.

All pipette systems which have disposable tips and are compatible with microtitration plates are based on the 9 mm pattern of microtitration plates and, in the case of multi-channel pipettes, realize this pattern in a linear or two-dimensional arrangement.

Since the introduction of the 384-well and 1536-well microtitration plates, various pipetting systems have been capable of handling the plates by multiple pipetting in the 9 mm pattern. This is, of course, accompanied by disadvantages in terms of speed.

Therefore, a 16-channel hand pipette, with special pipette tips which can be arranged in series at 4.5 mm intervals is being offered by the Labsystems company. The pipette tips are pushed onto cones and it is difficult for all these pipette tips to be pushed on

simultaneously in one step firmly enough for them really to be sealed.

It is therefore the object of this invention to produce a pipette tip which can be sealed at the end, is easier to handle and can be used for 384-well and 1536-well microtitration plates and in particular for two-dimensional series of large numbers of tips, for example 384.

According to the invention there is provided a pipette tip having a sealing surface 1 arranged at the end and a pressure-exerting annular surface 2 beneath the sealing surface in such a way that the greatest outside diameter of the pipette tip is less than 4.5mm.

Preferably the pipette tip is made of injection-mouldable plastic, for example fluorine-containing thermoplastic or polypropylene, the tip preferably having a hydrophobic coating.

According to another aspect of the invention there is provided a pipette tip having a sealing surface arranged at one end for sealing to a pipette and a pressure-exerting annular surface adjacent the sealing surface for clamping the sealing surface in a seal with a pipette.

An embodiment of the invention will now be described, by way of example, with reference to the figures of which:-

Fig. 1 is a side view of the tip according to the present invention;  
Fig. 2 shows an end view of the pipette tip viewed from above;  
Fig. 3 shows an end view of the pipette taken from below;  
Fig. 4 is a perspective view of the design of the pipette tip; and  
Fig. 5 shows the pipette tip in use.

Figures 1-5 show such a tip, the head of which is shaped in such a way that it has a smooth sealing region 1 in the form of an annular ring machined onto its end face. At the upper end of the head there is a pressure-exerting region 2, in the form of a circular ring made in a stepped shape having a

pressure-exerting lower annular surface, for pressing (F) the pipette tip in a frictionally locking manner, by means of a pressure-exerting element 5, against an abutment 6, on which there is fixed an elastomer 4, with which the end face of the pipette tip has contact. For the shaping of the pipette tip beneath the head there are various possibilities. Fig. 4 shows a design which makes it possible for a plunger to enter into the pipette tip over half the length of the pipette tip.

In addition, the outlet 3 of the pipette tip is shaped in such a way that it can even be used in the narrow depressions of the 1536-well microtitration plates.

The design follows the requirements for producing injection-moulded articles, so that production of this article from injectable plastics, such as polypropylene or fluoropolymers for example, is possible.

List of designations used:

- F - pressure-exerting force
- 1 - sealing region
- 5 2 - pressure-exerting region
- 3 - outlet
- 4 - elastomer
- 5 - pressure-exerting element
- 6 - abutment

## Claims

1. A pipette tip having a sealing surface 1 arranged at the end and a pressure-exerting annular surface 2 beneath the sealing surface in such a way  
5 that the greatest outside diameter of the pipette tip is less than 4.5 mm.
2. The pipette tip as claimed in 1 made of injection-mouldable plastic.
3. The pipette tip as claimed in 2 made of fluorine-containing  
10 thermoplastic.
4. The pipette tip as claimed in 2 made of polypropylene.
5. The pipette tip as claimed in claim 2 having a hydrophobic coating.  
15
6. A pipette tip having a sealing surface arranged at one end for sealing to a pipette and a pressure-exerting annular surface adjacent the sealing surface for clamping the sealing surface in a seal with a pipette.
- 20 7. A pipette tip substantially as herein described and as illustrated in the drawings.



INVESTOR IN PEOPLE

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Claims searched: ALL

Examiner: R E Hardy  
Date of search: 4 May 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): B1X (X2)

Int Cl (Ed.7): B01L (3/02)

Other: Online : WPI, EPODOC, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP0701865 A1 FUJI : See the Figures, seal 30	1,6
A	WO94/11108 A1 LABSYSTEMS OY : See Figs 3,5 and p.2 lines 10-13, 24-27	1,6
A	WO93/08913 A1 ABBOTT : See Fgiure 4, seals 78,80	1,6
A	US4748859 A MAGNUSSEN : Whole document	1,6
X	DE9204388 U JENOPTRON : See the Figures	6

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.